Writing your Dissertation with LaTeX

A Brief Tutorial

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About this presentation

Goals:

- to give an overview of what you can do with LaTeX
- to give an overview of what your dissertation should contain

Disclaimer: *this is not a complete reference to LaTeX. There are many good online references—go and read them (I give some links here). This is neither a lesson on how to write MsC dissertations—talk to your advisor before believing anything I say.*

Outline

Part I The LaTeX Typesetting System

Part II Writing your Dissertation

Part I

The LaTeX Typesetting System

Part I

1. Introduction
2. Typesetting
3. Mathematics
4. Bibliography
5. Other Useful Stuff

References

The (Not So) Short Introduction to LaTeX 2_ε
http://tobi.oetiker.ch/lshort/lshort.pdf

LaTeX— A document preparation system
http://latex-project.org/

LaTeX Tutorials — A Primer http://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf

Outline

1 Introduction
- Basics
- Compiling and Viewing

2 Typesetting

3 Mathematics

4 Bibliography

5 Other Useful Stuff

What is typesetting?

1. The text is entered into the computer
2. The input text is formatted into lines, paragraphs and pages
3. The output text is displayed on the computer screen
4. The final output is printed

What is typesetting?

2. The input text is formatted into lines, paragraphs and pages

What is typesetting?

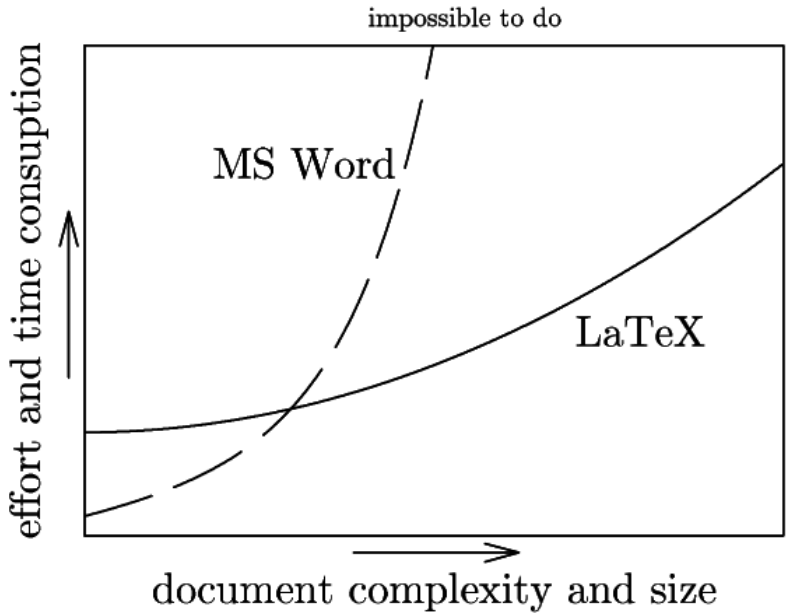
2. The input text is formatted into lines, paragraphs and pages

In other words:

if you want WYSIWYG, you're in the wrong lecture!

Why LaTeX?

- Separate content from presentation
- Get beautiful and complex documents with little effort



(source)

  - And see this StackExchange entry.
- Have you tried writing equations using a standard word processor?

TEX and LATEX

- TEX is a typesetting system created by Donald Knuth
  - Created for technical writing
  - In particular for writing math
  - And it is also a programming language
- LATEX is a set of high-level macros on top of TEX

Hello World

```
\documentclass{article}

\begin{document}
    This is my \emph{first} document
    prepared in \LaTeX.
\end{document}
```

Common file formats

.tex your source file(s), in plain text

.dvi the device independent file format binary files, with a description of the visual layout

.ps the PostScript vector graphics programming language (mostly used as a page description language)

.pdf the Portable Document Format binary files, with a description of the document layout (alternative to DVI)

Compiling (the traditional way)

You can compile using

```
> latex mainfile.tex
```

which outputs the `mainfile.dvi` DVI file. This file can be viewed with

```
> xdvi mainfile.dvi
```

And can be converted to PostScript for viewing and printing with

```
> dvips mainfile.dvi
```

Or to PDF, for the same purposes

```
> dvipdf mainfile.dvi
```

Compiling (the current way)

```
> pdflatex mainfile.tex
```

which outputs the `mainfile.pdf` file.

Advantages

- Generates a PDF in one step
- Handles many image formats (jpeg, png, ...)
- Better typesetting
- Other PDF features (hyperlinks, TOC, ...)

Problems

- Does not handle EPS images
- Does not work with PSTricks

... but who cares?[a]

[a] Actually, some people may care.

The result

This is my *first* document prepared in LaTeX.

Outline

1 Introduction

2 Typesetting
- Writing Text
- Style and Structure
- Lists
- Tables and Floats

3 Mathematics

4 Bibliography

5 Other Useful Stuff

The basic rules

- The document contains text and LaTeX commands
- Paragraphs are ended by a blank line
- Consecutive spaces count as one space
- Sequences of newline also count as one
- Newline and tab counts as a space
- The following are special characters:

```
# $ % ^ & _ { } ~ \
```

LaTeX commands

- Start with a backslash \
- The syntax:

```
\command[optional parameters]{parameters}
```

or just `\command` if they have no parameters. **Warning:** LaTeX ignores the space after the command, in this case.

```
You can \textsl{lean} on me!

Please, start a new line
right here!\\ Thank you!
```

You can *lean* on me!
Please, start a new line
right here!
Thank you!

Comments

- The character % is used for comments

```
This is a % nice comment
isn't it?
```

This is a isn't it?

Type styles

Type styles are specified by

family roman, sans serif, typewritter

```
\textrm{roman}, \textsf{sans serif},
\texttt{typewritter}
```

series medium, **boldface**

```
\textmd{medium}, \textbf{boldface}
```

shape upright, *italic*, *slanted*, SMALL CAP

```
\textup{upright}, \textit{italic},
\textsl{slanted}, \textsc{small cap}
```

Type sizes

Type sizes can be:

tiny	`\tiny`
scriptsize	`\scriptsize`
footnotesize	`\footnotesize`
small	`\small`
normalsize	`\normalsize`
large	`\large`
Large	`\Large`
LARGE	`\LARGE`
huge	`\huge`
Huge	`\Huge`

Document classes

- Every document needs to specify a class

```
\documentclass[options]{class}
```

- It determines how the document is typeset
- Examples:

  article for scientific articles
  report for technical reports
  book for books
  letter for letters

  and many others

Class options

- Some classes support options
- For example:

  10pt, 11pt, 12pt,... to set the font size
  a4paper, letterpaper, ... to set the paper size
  twocolumn, twoside, ... to set the page format

  and many other, often class-specific options

```
\documentclass[a4paper,12pt]{article}
```

Packages

- Packages are used to add extra capabilities

```
\usepackage[options]{package}
```

- Some useful packages:

inputenc	to specify the file encoding
babel	to add language specific features (e.g. hyphenation)
graphicx	to include pictures
hyperref	to include hyperlinks and URLs
algorithmic	to write pseudocode

and so on...

```
\usepackage[latin1]{inputenc}
```

Title and authors

To produce a title and related info:

```
\begin{document}

\title{document name}
\author{author 1 \and author 2 \and ...}
\date{date text}
\maketitle

...

\end{document}
```

Note: many classes provide their own version of these commands.

The abstract

For articles and reports you may want to produce an abstract:

```
\begin{abstract}
    This document contains a short introduction to
    \LaTeX. \LaTeX\ is a typesetting system for
    people who are constantly frustrated by having
    to fight the stubbornness of text processors
    that think they are smarter than you. ...
\end{abstract}
```

Structuring the document

Most classes contain sectioning commands:

```
part; chapter; section; subsection; subsubsection;
                paragraph; subparagraph;
```

```
\chapter{The Document}
...
\section{Dividing the document}
...
\subsubsection{Subexample}
...
```

An Example Article

Pável Calado
IST/INESC-ID

Nov/2013

Abstract

Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

1 The Pulpit

I had not been seated very long ere a man of a certain venerable robustness entered; immediately as the storm-pelted door flew back upon admitting him, a quick regardful eyeing of him by all the congregation, sufficiently attested that this fine old man was the chaplain. Yes, it was the famous Father Mapple, so called by the whalemen, among whom he was a very great favourite. He had been a sailor and a harpooneer in his youth, but for many years past had dedicated his life to the ministry. At the time I now write of, Father Mapple was in the hardy winter of a healthy old age; that sort of old

age which seems merging into a second flowering youth, for among all the fissures of his wrinkles, there shone certain mild gleams of a newly developing bloom—the spring verdure peeping forth even beneath February's snow. No one having previously heard his history, could for the first time behold Father Mapple without the utmost interest, because there were certain engrafted clerical peculiarities about him, imputable to that adventurous maritime life he had led. When he entered I observed that he carried no umbrella, and certainly had not come in his carriage, for his tarpaulin hat ran down with melting sleet, and his great pilot cloth jacket seemed almost to drag him to the floor with the weight of the water it had absorbed. However, hat and coat and overshoes were one by one removed, and hung up in a little space in an adjacent corner; when, arrayed in a decent suit, he quietly approached the pulpit.

Like most old fashioned pulpits, it was a very lofty one, and since a regular stairs to such a height would, by its long angle with the floor, seriously contract the already small area of the chapel, the architect, it seemed, had acted upon the hint of Father Mapple, and finished the pulpit without a stairs, substituting a perpendicular side ladder, like those used in mounting a ship from a boat at sea. The wife of a whaling captain had provided the chapel with a handsome pair of red worsted man-ropes for this ladder, which, being itself nicely headed, and stained with a mahogany colour, the whole contrivance, considering what manner of chapel it was, seemed by no means in bad taste. Halting for an instant at the foot of the ladder, and with both hands grasping the ornamental knobs of the man-ropes, Father Mapple cast a look upwards, and then with a truly sailor-like but still reverential dexterity, hand over hand, mounted the steps as if ascending the main-top of his vessel.

2 Squid

Slowly wading through the meadows of brit, the Pequod still held on her way north-eastward towards the island of Java; a gentle air impelling her keel, so that in the surrounding serenity her three tall tapering masts mildly waved to that languid breeze, as three mild palms on a plain. And still, at wide intervals in the silvery night, the lonely, alluring jet would be seen.

But one transparent blue morning, when a stillness almost preternatural spread over the sea, however unattended with any stagnant calm; when the long burnished sun-glade on the waters seemed a golden finger laid across them, enjoining some secrecy; when the slippered waves whispered together as they softly ran on; in this profound hush of the visible sphere a strange spectre was seen by Daggoo from the main-mast-head.

In the distance, a great white mass lazily rose, and rising higher and higher, and disentangling itself from the azure, at last gleamed before our prow like a snow-slide, new slid from the hills. Thus glistening for a moment, as slowly it subsided, and sank. Then once more arose, and silently gleamed. It seemed not a whale; and yet is this Moby Dick? thought Daggoo. Again the phantom went down, but on re-appearing once more, with a stiletto-like cry that startled every man from his nod, the negro yelled out—"There! there again! there she breaches! right ahead! The White Whale, the White Whale!"

Upon this, the seamen rushed to the yard-arms, as in swarming-time the bees rush to the boughs. Bare-headed in the sultry sun, Ahab stood on the bowsprit, and with one hand pushed far behind in readiness to wave his orders to the helmsman, cast his eager glance in the direction indicated aloft by the outstretched motionless arm of Daggoo.

Whether the flitting attendance of the one still and solitary jet had gradually worked upon Ahab, so that he was now prepared to connect the ideas of mildness and repose with the first sight of the particular whale he pursued; however this was, or whether his eagerness betrayed him; whichever way it might have been, no sooner did he distinctly perceive the white mass, than with a quick intensity he instantly gave orders for lowering.

The four boats were soon on the water; Ahab's in advance, and all swiftly pulling towards their prey. Soon it went down, and while, with oars suspended, we were awaiting its reappearance, lo! in the same spot where it sank, once more it slowly rose. Almost forgetting for the moment all thoughts of Moby Dick, we now gazed at the most wondrous phenomenon which the secret seas have hitherto revealed to mankind. A vast pulpy mass, furlongs in length and breadth, of a glancing cream-colour, lay floating on the water, immmerable long arms radiating from its centre, and curling and twisting like a nest of anacondas, as if blindly to clutch at any hapless object within reach. No perceptible face or front did it have; no conceivable token of either sensation or instinct; but undulated there on the billows, an unearthly, formless, chance-like apparition of life.

3 Etc.

Etc. etc. etc. ...

Acknowledgments

Herman Melville, for the text.

An Example Book

Pável Calado
IST/INESC-ID

Nov/2013

Chapter 1

The Pulpit

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Chapter 2

Squid

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Chapter 3

Etc.

Etc. etc. etc. ...

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November 24, 2013

An example letter

Dear Sir/Madam

I shall ere long paint to you as well as one can without canvas, something like the true form of the whale as he actually appears to the eye of the whaleman when in his own absolute body the whale is moored alongside the whale-ship so that he can be fairly stepped upon there. It may be worth while, therefore, previously to advert to those curious imaginary portraits of him which even down to the present day confidently challenge the faith of the landsman. It is time to set the world right in this matter, by proving such pictures of the whale all wrong.

It may be that the primal source of all those pictorial delusions will be found among the oldest Hindoo, Egyptian, and Grecian sculptures. For ever since those inventive but unscrupulous times when on the marble panellings of temples, the pedestals of statues, and on shields, medallions, cups, and coins, the dolphin was drawn in scales of chain-armor like Saladin's, and a helmeted head like St. George's; ever since then has something of the same sort of license prevailed, not only in most popular pictures of the whale, but in many scientific presentations of him.

Sincerely,

Pável Pereira Calado

The table of contents

\tableofcontents produces a table of contents

\listoffigures produces a list of figures

\listoftables produces a list of tables

Environments

- Most of the following features are environments
- They are defined as:

```
\begin{environment}[options]
...
\end{environment}
```

Bullet lists

```
\begin{itemize}
\item this is a
\item bullet list
\item in \latex
    \begin{itemize}
    \item which can
    \item contain other lists
    \end{itemize}
\end{itemize}
```

- this is a
- bullet list
- in LaTeX
  - which can
  - contain other lists

Enumerations

```
\begin{enumerate}
\item this is a
\item numbered list
\item in \latex
    \begin{enumerate}
    \item which can
    \item contain other lists
    \end{enumerate}
\end{enumerate}
```

1. this is a
2. numbered list
3. in LaTeX
    1. which can
    2. contain other lists

Descriptions

```
\begin{description}
\item[a line] this is a
\item[another line] description list
\item[etc.] in \latex
    \begin{description}
    \item[and some] which can
    \item[more] contain other lists
    \end{description}
\end{description}
```

a line this is a
another line description list
etc. in LaTeX
and some which can
more contain other lists

Tables

Tables are created with the tabular environment

```
\begin{tabular}[position]{specs}
```

pos table vertical alignment (t: top; b: bottom; c: center

specs column specifications

- l left-justified column
- c centered column
- r right-justified column
- p{width} paragraph column
- | vertical line

Within the table & separates columns, \\ creates a new row, and \hline and \cline create horizontal lines

An example

```
\begin{tabular}{|l|c|p{10em}|}\hline
    \textbf{Name} & \textbf{Age} & \textbf{Comments}\\\hline\hline
    Rodion Romanovich Raskolnikov & 23 & A former student.\\\hline
    Sofya Semyonovna Marmeladov & & Raskolnikov's love.\\\hline
    Dmitri Prokofych Razumikhin & & A poor ex-student.\\\cline{3-3}
    & & He is Raskolnikov's best friend.\\\hline
\end{tabular}
```

Name	**Age**	**Comments**
Rodion Romanovich Raskolnikov	23	A former student.
Sofya Semyonovna Marmeladov		Raskolnikov's love.
Dmitri Prokofych Razumikhin		A poor ex-student.
		He is Raskolnikov's best friend.

Floating bodies

- Some tables and figures cannot be broken across pages
- To solve this problem, we define them as floats

```
\begin{table}[placement] ... \end{table}
```

```
\begin{figure}[placement] ... \end{figure}
```

Float placement

- We can specify placement as:
  - h (here) to place the float exactly where it is defined
  - t (top) to place the float on the top of the page
  - b (bottom) to place the float on the bottom of the page
  - p (page) to place the float on its own page
  - ! to disregard some space restriction when trying to place the float
- These are specified by order of priority

```
\begin{table}[htb!]  ...  \end{table}
```

Warning: LaTeX will try to place the float according to the specification, but only if and where it finds room for it, so be ready for surprises.

Captions and labels

Floats should have a caption, to described them and a label to be referenced.

```
Table~\ref{important} illustrates
this point.
\begin{table}[!hbtp]
    \begin{tabular}{c|c|c}
        a & b & c \\\hline
        1 & 2 & 2 \\
        2 & 2 & 4 \\
        3 & 2 & 6 \\
    \end{tabular}
    \caption{Important table for
            scientists.}
    \label{important}
\end{table}
```

Table 1 illustrates this point.

a	b	c
1	2	2
2	2	4
3	2	6

Table 1: Important table for scientists.

More about labels

You can also use labels on sections, chapters, items, equations, ...

```
...
\section{Introduction}
\label{intro}
...
\section{Motivation}
\label{motiv}

As explained in Section~\ref{intro} ...
```

Outline

1 Introduction

2 Typesetting

3 Mathematics
- Basic Math
- Writing Equations
- Matrices
- Delimiters

4 Bibliography

5 Other Useful Stuff

Writing math

Math is the reason for LaTeX existence

It can be typed in-text, like this $ax + by + c = 0$ or on its own, using the displaymath environment

$$ax + by + c = 0$$

as shown here.

```
It can be typed \emph{in-text},
like this $ax + by + c = 0$ or
on its own, using the
\emph{displaymath} environment
\begin{displaymath}
    ax + by + c = 0
\end{displaymath}
as shown here.
```

Common types

superscript

```
x^n + y^{2^n} = z^n
```

$$x^n + y^{2^n} = z^n$$

subscript

```
x_i^n + y_j = z_{i_j}
```

$$x_i^n + y_j = z_{i_j}$$

roots

```
\sqrt{x} + \sqrt[3]{y} = \sqrt{x + y}
```

$$\sqrt{x} + \sqrt[3]{y} = \sqrt{x + y}$$

symbols

```
\alpha \times \rho = \gamma \circ \delta
```

$$\alpha \times \rho = \gamma \circ \delta$$

Sums, integrals, and products

```
\begin{displaymath}
    \sum_{i=1}^n
\end{displaymath}
```

$$\sum_{i=1}^{n}$$

```
\begin{displaymath}
    \int_0^{\frac{\pi}{2}}
\end{displaymath}
```

$$\int_0^{\frac{\pi}{2}}$$

```
\begin{displaymath}
    \prod_\epsilon
\end{displaymath}
```

$$\prod_{\epsilon}$$

Fractions

```
\frac{\partial^2f}{\partial x^2} =
                          \sqrt{\frac{x^2}{k+1}}
```

$$\frac{\partial^2 f}{\partial x^2} = \sqrt{\frac{x^2}{k+1}}$$

The amsmath package

```
\usepackage{amsmath}
```

- Part of the $\mathcal{AMS}$-LaTeX bundle
- Which is a set of extensions developed by the American Mathematical Society
- And is included in the standard LaTeX distributions

Single equations

```
\begin{equation}
    ax + by + c = 0
    \label{findroots}
\end{equation}
```

$$ax + by + c = 0 \tag{1}$$

Notice the equation number on the right. This is equation 1.

Long equations

```
\begin{multline}
    (a+b+c+d+e)^2=a^2+b^2+c^2+d^2+e^2\\
    +2ab+2ac+2ad+2ae+2bc\\
    +2bd+2be+2cd+2ce+2de
\end{multline}
```

$$(a+b+c+d+e)^2 = a^2+b^2+c^2+d^2+e^2 + 2ab+2ac+2ad+2ae+2bc + 2bd+2be+2cd+2ce+2de \quad (2)$$

Groups of equations

```
\begin{gather}
    (a,b)+(c,d)=(a+c,b+d)\\
    (a,b)(c,d)=(ac-bd,ad+bc)
\end{gather}
```

$$(a, b) + (c, d) = (a + c, b + d) \quad (3)$$
$$(a, b)(c, d) = (ac - bd, ad + bc) \quad (4)$$

```
\begin{align}
    x+y-z &= 1\\
    x-y+z &= 1
\end{align}
```

$$x + y - z = 1 \quad (5)$$
$$x - y + z = 1 \quad (6)$$

Matrices

```
\begin{equation}
    \begin{pmatrix}
        1 & 1 & -1\\
        1 & -1 & 1\\
        1 & 1 & 1
    \end{pmatrix}
    \begin{pmatrix}
        x\\
        y\\
        z
    \end{pmatrix} =
    \begin{pmatrix}
        1\\
        1\\
        1
    \end{pmatrix}
\end{equation}
```

$$\begin{pmatrix} 1 & 1 & -1 \\ 1 & -1 & 1 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \quad (7)$$

You can also try bmatrix and vmatrix

Left and right

```
\left( \sqrt{\frac{x^2}{k+1}} + y \right)
```

$$\left(\sqrt{\frac{x^2}{k+1}} + y \right)$$

Above and below

```
\underbrace{\overbrace{(a+b+c)}^x
                       \overbrace{(d+e+f)}^y}_z
```

$$\underbrace{\overbrace{(a+b+c)}^{x}\overbrace{(d+e+f)}^{y}}_{z}$$

Some useful references

Detexify2 http://detexify.kirelabs.org/classify.html

The Comprehensive LaTeX Symbol List http://tug.ctan.org/info/symbols/comprehensive/symbols-a4.pdf

List of Mathematical Symbols http://en.wikibooks.org/wiki/LaTeX/Mathematics#List_of_Mathematical_Symbols

Outline

1 Introduction

2 Typesetting

3 Mathematics

4 Bibliography
- The Bibliography
- BibTeX

5 Other Useful Stuff

The bibliography

LaTeX provides the thebibliography environment to cross-reference publications

```
\begin{thebibliography}{widest-label}
\bibitem{key1}
\bibitem{key2}
\end{thebibliography}
```

widest-label is a string of the same size as the widest label in the bibliography list

- The command \cite{key} is then used to reference the publications

An example

```
It is hard to write unstructured and disorganized documents
using \LaTeX~\cite{les85}. It is interesting to typeset one
equation~\cite[Sec 3.3]{les85} rather than setting ten
pages of running matter~\cite{don89,rondon89}.

\begin{thebibliography}{9}
\bibitem{les85} Leslie Lamport, 1985. \emph{\LaTeX---A
Document Preparation System---User's Guide and Reference
Manual}, Addision-Wesley, Reading.
\bibitem{don89} Donald E. Knuth, 1989. \emph{Typesetting
Concrete Mathematics}, TUGBoat, 10(1):31-36.
\bibitem{rondon89} Ronald L. Graham, Donald E. Knuth, and
Ore Patashnik, 1989. \emph{Concrete Mathematics: A
Foundation for Computer Science}, Addison-Wesley, Reading.
\end{thebibliography}
```

The result

It is hard to write unstructured and disorganized documents using LaTeX [1]. It is interesting to typeset one equation [1, Sec 3.3] rather than setting ten pages of running matter [2,3].

Bibliography

[1] Leslie Lamport, 1985. LaTeX—A Document Preparation System—User's Guide and Reference Manual, Addision-Wesley, Reading.
[2] Donald E. Knuth, 1989. Typesetting Concrete Mathematics, TUGBoat, 10(1):31-36.
[3] Ronald L. Graham, Donald E. Knuth, and Ore Patashnik, 1989. Concrete Mathematics: A Foundation for Computer Science, Addison-Wesley, Reading.

The BibTeX program

- BibTeX creates a bibliography from a bibliographic database
- The command

```
\bibliography{database1,database2}
```

would include the databases in files database1.bib and database2.bib

Bibliographic Databases

- A bibliographic database stores useful bibliographic entries
- On using a bibliographic database:

  cons demands more work to write

  pros only done once and is independent of the presentation style

The database files

An example bibliographic entry:

```
@book{knuth:86a,
    author = {Donald E. Knuth},
    title = {The \TeX{}book},
    edition = {third},
    publisher = {Addison-Wesley},
    address = {Reading, MA},
    year = 1986}
```

Other types of entries include article, inbook, inproceedings, mastersthesis, ...

Bibliography Styles

BibTeX allows choosing a presentation style

```
\bibliographystyle{style}
```

style can be one of:

- **plain** Entries sorted alphabetically with numeric labels
- **alpha** Entries sorted by citation with numeric labels
- **apalike** Entries are formatted alphabetically, last name first, each entry having a hanging indentation and no label

among many others.

An example

```
\bibliographystyle{plain}
\bibliography{database}
```

Compiling with BibTeX

```
> pdflatex mainfile
```

generates a list of \cite references in an auxiliary file

```
> bibtex mainfile
```

writes a file containing the formatted references

```
> pdflatex mainfile
```

reads the generated reference file

```
> pdflatex mainfile
```

(yes, again) resolves all references

Outline

1 Introduction

2 Typesetting

3 Mathematics

4 Bibliography

5 Other Useful Stuff
- Language Support
- Including Graphics
- Presentations
- Finally

The babel package

LaTeX may need to be configured for some languages

- Strings such as “Chapter” need to be translated
- Hyphenation rules are different
- Typographic rules are different

We use the babel package

```
\usepackage[language]{babel}
```

Adapting to Portuguese

```
1 \usepackage[portuguese]{babel}
2 \usepackage[T1]{fontenc}
3 \usepackage{lmodern}
4 \usepackage[latin1]{inputenc}
```

1 to load the Portuguese rules for the babel package

2–3 to get the correct fonts (with accents and other symbols)

4 to enable reading the *latin-1* encoded source file

The graphicx package

```
\usepackage{graphicx}
```

and to include a picture

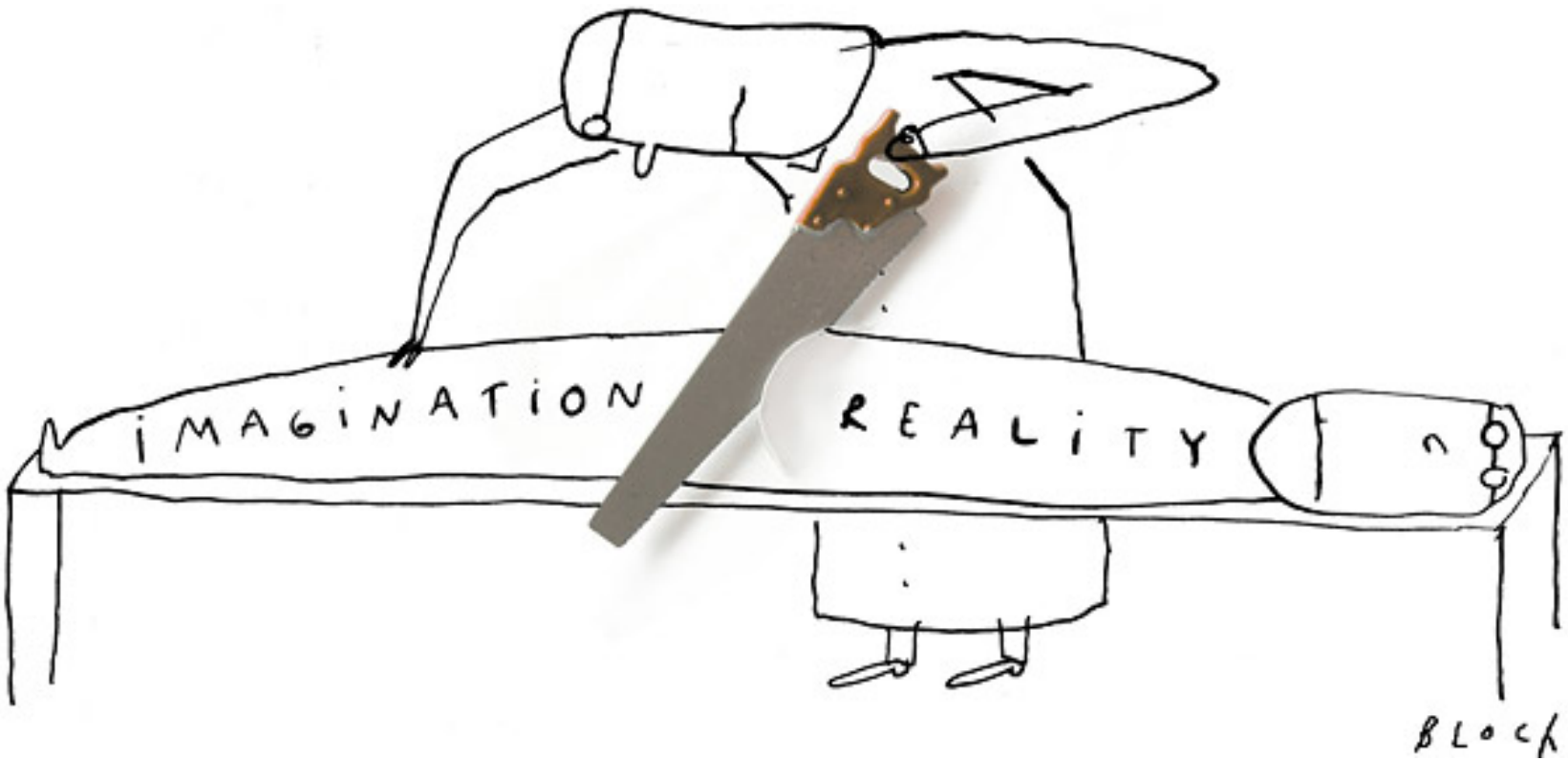
```
\includegraphics[options]{filename}
```

filename is a file of type `.png`, `.pdf`, `.jpg`, or `.mps`

options can be width, height, scale, angle, ...

An example

```
\includegraphics[scale=.5]{serge_bloch}
```



How to build presentations in LaTeX

I used the beamer package to build this presentation.

It speaks for itself.

`https://www.tug.org/teTeX/tetex-texmfdist/doc/latex/beamer/beameruserguide.pdf`

Stuff I did not talk about...

... but that you should look up in a reference text

footnotes, margin notes, end notes, paragraph justification, spacing, quotes, dashes, page styles, page numbering, lengths, including multiple files, more citation styles, building an index, poetry, tabbing, theorems and proofs, boxes, more math features, many other useful packages, making your own packages and classes

and I am probably forgetting something.

Also, check out the LaTeX wikibook at `http://en.wikibooks.org/wiki/LaTeX`, the StackExchange TeX site (`http://tex.stackexchange.com/`), and the list of TeX editors at Wikipedia (`http://en.wikipedia.org/wiki/Comparison_of_TeX_editors`).

Part II

Writing your Dissertation

Part II

6 Writing a Dissertation

7 The Contents

8 Using LaTeX

References

How to Write a Master's Thesis in Computer Science
http://cs.fit.edu/~wds/guides/howto/

How to Organize your Thesis http://www.sce.carleton.ca/faculty/chinneck/thesis.html

Outline

6 Writing a Dissertation
- What is a Disseetation?
- How to Write a Dissertation?

7 The Contents

8 Using LaTeX

The goals of your dissertation/thesis

- Analyze an issue
  - Usually an open question or an unexplored idea
- Explore the issue
  - Ask questions and find the answers
- Present your analysis to an audience
  - This is where the thesis comes in

General Structure

The document should contain (at least) the following items:

1. Summary (or abstract)
2. Introduction
3. Related Work
4. Work Done
5. Experiments
6. Results
7. Discussion
8. Conclusions
9. Future Work

How to write it?

1. Determine the purpose of the thesis
2. Determine who is the audience
3. and Write it
   - List all the ideas you want to include
   - Group related ideas together
   - Arrange them in sections and subsections

A good start

1. Start by defining all sections (or chapters)
2. Define subsections when they are obvious
   - go no deeper than subsections (for now)
3. Write short paragraphs in each section stating what you want to say
   - around 2-4 lines each
4. Join the paragraphs, filling in with text
   - create subsubsections, if appropriate
   - but do not overdo it

The rules for writing

When writing the document you should keep in mind

Parallelism each heading and subheading should preserve parallel structure

- if the first heading is a noun, the second heading should be a noun

Coordination all the information contained in Heading 1 should have the same significance as the information contained in Heading 2

- the same goes for the subheadings (which should be less significant than the headings)

Subordination the information in the headings should be more general, while the information in the subheadings should be more specific

Division each heading should be divided into 2 or more parts

Outline

6 Writing a Dissertation

7 The Contents
- Inside Each Section

8 Using LaTeX

The Summary

should answer What did I do, in a nutshell?

function
- summarize the work
- should be written last

contents
- very short context
- what the objectives of the study were
- how the study was done
- what results were obtained (only major findings)
- and the significance of the results (interpretations and conclusions)

Introduction

should answer

- What is the problem?
- Why is it important?
- How will this study advance our knowledge?

function

- Establish the context
- State the purpose of the work
- Briefly explain the rationale, the approach, and the outcomes

contents

- Set the context
  - provide general information about the main idea
  - explain the situation (so the reader can make sense of the topic and the questions you will ask)

Introduction (cont.)

contents (cont.)

- State why the main idea is important
  - tell the reader why she should care and keep reading
  - create an essay that is compelling, clear, and educational
- State your research question
  - compose a question or two that clearly communicate what you want to discover and why you are interested in the topic
- State your contributions
- Show a preview of the results
- Outline the structure
  - state what each section contains
  - or state what you will write

Related Work

should answer	• What did we know about the problem before I did this study? • What did we do different from previous works?
function	• discuss the relevant primary research literature
contents	• description of other works related to the subject • works should be organized by their relevant characteristics (do not simply list the works) • give more detail to works closely related • give less detail to works loosely related • comment on why it is relevant for your work • comment on what your work does differently (or why it is better/worse)

Work Done

should answer	• How did I solve the problem?
function	• Describe the work done
contents	• Description of what you are proposing

Experiments

should answer
- How did I test my proposal?

function
- explain clearly how you carried out your study
- show the methodological details necessary for another person to duplicate your work

contents
- case problems or data studied
  - characteristics and pre-experiment setup
- experimental design
  - variables measured
  - sampling strategy (if any)
  - hypotheses tested
- how the data were analyzed
  - qualitative analyses
  - statistical procedures used (e.g. statistical tests)
  - analyses employed
  - data transformation (e.g. to normalize or equalize variances)

Results

should answer
- What did I find out?

function
- objectively present your key results (i.e. without interpretation)

contents
- presentation of the results of the experiments
  - using tables and figures
  - does not attempt to interpret their meaning
- but may contain short comments on the results

Discussion

should answer

- What does it mean?
  - Do your results provide answers to your hypotheses?
  - Do your findings agree with what others have shown?
  - What is our new understanding of the problem?

function

- interpret the results in light of what was already known

contents

- explanation what the results mean
- explanation of why they differ from what others have found
- relation to the objectives and questions raised

Conclusions

should answer
- What did I do, in a nutshell?
- What did I achieve?

function
- present a concluding summary of the work

contents
- highlight of our solution
- overview of the more relevant results
- restatement of the problem explored
  - outline of some of its possible causes
  - state why the results are relevant to the solution
- discussion of open questions

Future Work

should answer
- What still needs to be done?
- What experiments would you do next?

function
- present further steps needed to provide more advances in the knowledge of the problem

contents
- discussion of where you might look to answer open questions
- discussion of other forms of research you would have to do
- brief enumeration of possible future developments of your work

Outline

6 Writing a Dissertation

7 The Contents

8 Using LaTeX
- An Example

Your dissertation in LaTeX

Now, do all of the above, using LaTeX.

Your dissertation in LaTeX

Now, do all of the above, using LaTeX.

More seriously, here is an example
(created by Prof. Bruno Martins)

That's it.

Enjoy your new knowledge!